4. (Amended) A method for playback of multi-channel sound signals with at least two channels including substantially orthogonal spatialisation characteristics , on a speaker arrangement, said method comprising the steps of:

a7

(a) decoding said signals for a set of virtual speakers placed around a listener so as to produce a set of decoded speaker signals with the projection direction of at least two of said virtual speakers being substantially orthogonal; and

(b) projecting said set of decoded speaker signals from a series of closely clustered speakers with at least two of said clustered speakers having substantially orthogonal projection directions and being coupled to corresponding substantially orthogonal virtual speaker decoded speaker signals.

Please add the following new Claims:

a8

6. A method of increasing the realism of a sound reproduction, the method comprising the steps of:

(a) providing a multi-channel sound recording with different channels having substantially orthogonal spatial components; and

(b) projecting from a series of speakers placed in the same cabinet, the substantially orthogonal spatial components in a substantially orthogonal projection direction.

7. A method as claimed in claim 6 wherein said substantially orthogonal spatial components include B-format signal components.

REMARKS

The applicant has chosen to amend the claims so as to more carefully define the invention over the cited prior art references.

By way of background, the present invention, in arranging the orthogonal spatialisation components for projection attempts to approximate the acoustic radiation pattern of an actual instrument. The standard prior art loudspeaker arrangements does not and can not emulate the acoustic radiation pattern of a real instrument. A standard loudspeaker has a radiation pattern that is unique to the nature of the physical construction of the loudspeaker.

Real instruments such as a violin on the other had have complex radiation patterns that have sound emanating in all directions. Hence the acoustic radiation pattern of a standard loudspeaker and a real instrument are substantially different.

In the preferred embodiment, a series of speakers are arranged in a single cabinet and by driving them in a specific manner the acoustic radiation pattern akin to a real instrument can be emulated.

Existing loudspeaker reproduction systems often attempt to create a sound field around a listener in such a way as to have the listener believe that they are inhabiting another space, different to the one they are presently in. That is, they attempt to transport the listener to the venue of the performance being reproduced.

By contrast. the system of the preferred embodiment is directed to recreating the experience of an instrument being played in the same room as a listener. A real instrument being played in a room will radiate its sound in a highly complex manner. Different frequencies and compopents of the sound will be radiated in different directions. That is, the frequency response of the direct sound path away from the instrument to the ears of a listener is highly dependent on the orientation of the instrument with respect to the listener. Further, the reflected sound pattern from a real instrument is very different from the pattern emitted by a single loudspeaker or series of arranged loudspeakers, again because of the highly complex and different way the various frequency and transient components of the sound are radiated. The preferred embodiment in projecting the different B-format sound components in an orthogonal manner, approximates such an instrument.

The projection method disclosed in the prior art documents, alone or in combination, do not disclose the idea of projecting orthogonal sound components substantially orthogonally.

US 5757927 to Gerzon et al. discloses a B-format decoder for decoding B-format signals into five channel signals for placement around a listener. The decoder maps the orthogonal components into five channel components in a complex mathematical manner and does not include any form of projection from a single speaker cabinet of orthogonal components in an orthogonal manner as required by claim 1.

US Patent 5784468 to Klayman discloses a system of dual speaker units with each speaker unit further including two orthogonally spaced speakers. Each speaker emits a complex signal such that the signals, when combined, produced enhanced effects for a listener positioned in front of the speakers. However, there is no disclosure in Klayman of emitting any orthogonal components in an orthogonal manner. Indeed there is no disclosure in Klayman of the utilisation of orthogonal components.

Combining Klayman with Gerzon et al. would still fail to teach emission of orthogonal components in an orthogonal manner from a single speaker cabinet. As the basis for doing this is a previously unknown effect, there would also be no expectation of advantage in combining the references.

US 6,084,970 to Aarts et al discloses a system for converting a monaural signal into a stereo signal by dividing up frequency bands into left and right outputs. This citation has no teaching of emission of orthogonal components in an orthogonal manner from a single speaker cabinet.

US 5,889,876 to Billings discloses a speaker system with a plurality of speakers arranged in a hemispherically directed array so as to produce an omnidirectional speaker output. There is no teaching in Billings of emission of orthogonal spatial components in an orthogonal manner from a single speaker cabinet. Indeed, Billings is directed at the opposite of developing an omnidirectional speaker output.

US 5,199,075 to Fosgate discloses a ceiling mounted speaker cabinet but includes no disclosure of the emission of orthogonal spatial components in an orthogonal manner from a single speaker cabinet

Amendment of the subject application is respectfully requested.

Respectfully submitted,

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Enclosures: Appendix A (1 page)

Please amend the claims as follows:

1.(Twice amended) An apparatus for playback of multi-channel sound signals with at least two channels including substantially orthogonal spatialisation characteristics [having spatial characteristics], said apparatus comprising:

a decoder for converting said multi-channel sound signals into a series of speaker outputs for virtual speakers placed in pre-determined positions around a listener and projecting sound towards a listener, with the projection direction of at least two of said virtual speakers being substantially orthogonal;

a single speaker cabinet;

a multiplicity of speaker elements arranged around said cabinet, said speaker elements coupled with predetermined ones of said series of speaker outputs, with at least two of said speaker elements having substantially orthogonal projection directions from said single speaker cabinet and being coupled to substantially orthogonal virtual speaker outputs of said decoder [so as to project their acoustic output substantially in the radial direction that a virtual speaker would be placed around said cabinet if said cabinet were said listener to said virtual speakers].

4. (Amended) A method for playback of multi-channel sound signals with at least two channels including substantially orthogonal spatialisation characteristics [having spatial characteristics], on a speaker arrangement, said method comprising the steps of:

(a) decoding said signals for a set of virtual speakers placed around a listener so as to produce a set of decoded speaker signals with the projection direction of at least two of said virtual speakers being substantially orthogonal; and

(b) projecting said set of decoded speaker signals from a series of closely clustered speakers with at least two of said clustered speakers having substantially orthogonal projection directions and being coupled to corresponding substantially orthogonal virtual speaker decoded speaker signals. [with each of said decoded speaker signals being projected in a direction of corresponding virtual speaker located around said cluster].